

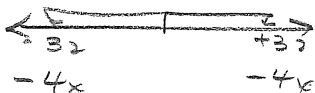
key

# Absolute Value Equations & Inequalities Practice

Name: \_\_\_\_\_

## Solve the Equation

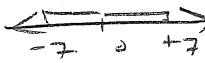
1.  $|-4x| = 32$



$$\begin{array}{rcl} -4x = -32 & -4x = +32 & \\ x = +8 & x = -8 & \end{array}$$

$\{-8, 8\}$


2.  $2|3x-2| = 14$



$$\begin{array}{rcl} |3x-2| = 7 & & \\ \begin{array}{r} 3x-2 = -7 \\ +2 \quad +2 \\ \hline 3x = -5 \\ x = -\frac{5}{3} \end{array} & \begin{array}{r} 3x-2 = +7 \\ +2 \quad +2 \\ \hline 3x = 9 \\ x = 3 \end{array} & \end{array}$$

$\{-\frac{5}{3}, 3\}$

3.  $|x+4| + 3 = 17$

$$|x+4| = 14$$


$$\begin{array}{rcl} x+4 = -14 & x+4 = +14 & \\ -4 \quad -4 & -4 \quad -4 & \\ \hline x = -18 & x = +10 & \end{array}$$

$\{-18, 10\}$

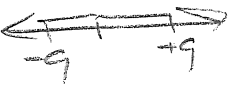
4.  $-2|2x-3| = 2$

$$|2x-3| = -1$$

no solution

5.  $8 - |x+4| = -1$

$$-|x+4| = -9$$

$$|x+4| = 9$$


$$\begin{array}{rcl} x+4 = -9 & x+4 = +9 & \\ -4 \quad -4 & -4 \quad -4 & \\ \hline x = -13 & x = 5 & \end{array}$$

$\{-13, 5\}$

6.  $3|4w+1| - 5 = 10$

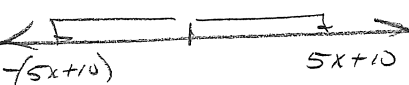
$$3|4w+1| = 15$$

$$|4w+1| = 5$$

$$\begin{array}{rcl} 4w+1 = -5 & 4w+1 = +5 & \\ -1 \quad -1 & -1 \quad -1 & \\ \hline 4w = -6 & 4w = 4 & \\ w = -\frac{3}{2} & w = 1 & \end{array}$$

$\{-\frac{3}{2}, 1\}$

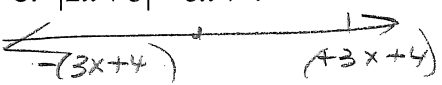
7.  $|x-1| = 5x+10$



$$\begin{array}{rcl} x-1 = -5x-10 & x-1 = 5x+10 & \\ +5x \quad +5x & -x \quad -x & \\ \hline 6x-1 = -10 & -1 = 4x+10 & \\ +1 \quad +1 & -10 \quad -10 & \\ \hline 6x = -9 & -11 = 4x & \\ x = -\frac{3}{2} & -\frac{11}{4} = x & \end{array}$$

$\{-\frac{3}{2}\}$

8.  $|2x+5| = 3x+4$



$$\begin{array}{rcl} 2x+5 = -3x-4 & 2x+5 = 3x+4 & \\ +3x \quad +3x & -2x \quad -2x & \\ \hline 5x+5 = -4 & 5 = x+4 & \\ -5 \quad -5 & -4 \quad -4 & \\ \hline 5x = -9 & 1 = x & \\ x = -\frac{9}{5} & & \end{array}$$

$\{-\frac{9}{5}, 1\}$

9.  $\frac{|7p+4|}{8} = 3$

$$|7p+4| = 24$$

$$\begin{array}{rcl} 7p+4 = -24 & 7p+4 = +24 & \\ -4 \quad -4 & -4 \quad -4 & \\ \hline 7p = -28 & 7p = 20 & \\ p = -4 & p = \frac{20}{7} & \end{array}$$

$\{-4, \frac{20}{7}\}$

10.  $\frac{2}{3}|3x-6| = 4(x-2)$

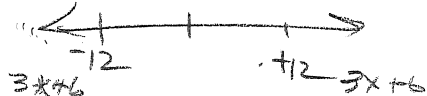
$$\left(\frac{3}{2}\right) \frac{2}{3}|3x-6| = (4x-8) \frac{3}{2}$$

$$|3x-6| = 6x-12$$

$$\begin{array}{rcl} 3x-6 = -6x+12 & 3x-6 = 6x-12 & \\ +6x \quad +6x & -3x \quad -3x & \\ \hline 9x-6 = 12 & -6 = 3x-12 & \\ +6 \quad +6 & +6 \quad +6 & \\ \hline 9x = 18 & 6 = 3x & \\ x = 2 & x = 2 & \end{array}$$

# Solve and Graph the Inequality

11.  $|3x+6| \geq 12$

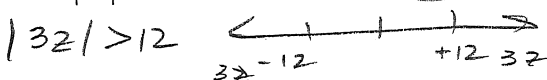


$$\begin{array}{rcl} 3x+6 & \leq & -12 \\ -6 & & -6 \end{array} \quad \begin{array}{rcl} 12 & \leq & 3x+6 \\ -6 & & -6 \end{array}$$

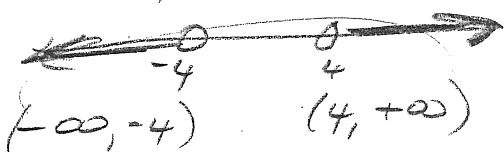
$$\begin{array}{rcl} 3x & \leq & -18 \\ x & \leq & -6 \end{array} \quad \begin{array}{rcl} 6 & \leq & 3x \\ 2 & \leq & x \\ x & \geq & 2 \end{array}$$



13.  $|3z-4| > 8$



$$\begin{array}{rcl} 3z-4 & < & -8 \\ 3 & & 3 \end{array} \quad \begin{array}{rcl} 8 & < & 3z-4 \\ 4 & & 4 \end{array}$$

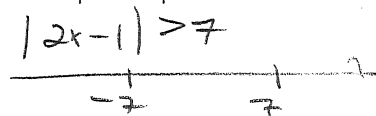


15.  $\frac{1}{4}|x-3|+2 < 1$

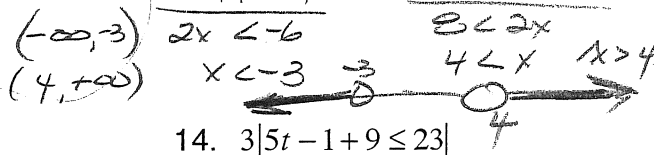
$$\begin{array}{rcl} \frac{1}{4}|x-3| & < & -1 \\ |x-3| & < & -4 \end{array}$$

no solution

12.  $3|2x-1| > 21$

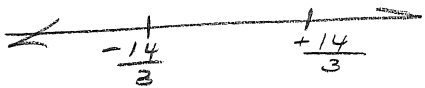


$$\begin{array}{rcl} 2x-1 & < & -7 \\ +1 & & +1 \end{array} \quad \begin{array}{rcl} 7 & < & 2x-1 \\ +1 & & +1 \end{array}$$



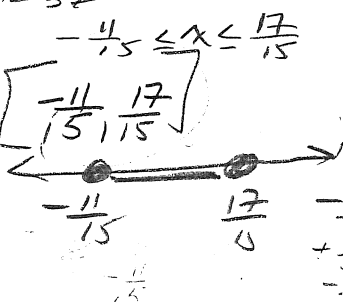
14.  $3|5t-1|+9 \leq 23$

$$\begin{array}{rcl} 3|5t-1|+9 & \leq & 23 \\ -9 & & -9 \end{array} \quad \begin{array}{rcl} 3|5t-1| & \leq & 14 \\ |5t-1| & \leq & \frac{14}{3} \end{array}$$

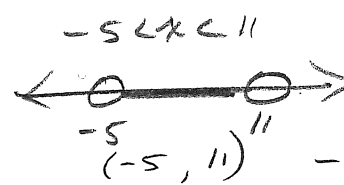


$$\begin{array}{rcl} 5t-1 & \leq & \frac{14}{3} \\ +1 & & +1 \end{array} \quad \begin{array}{rcl} 5t & \leq & \frac{17}{3} \\ t & \leq & \frac{17}{15} \end{array}$$

$$\begin{array}{rcl} -\frac{14}{3} & \leq & 5t-1 \\ +\frac{1}{3} & & +\frac{1}{3} \end{array} \quad \begin{array}{rcl} -\frac{11}{3} & \leq & 5t \\ -\frac{11}{15} & \leq & t \end{array}$$



16.  $\left| \frac{x-3}{2} + 2 \right| < 6$

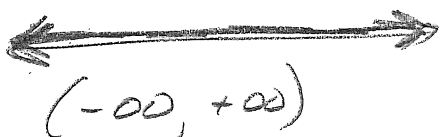


$$\begin{array}{rcl} \left| \frac{x-3}{2} + 2 \right| & < & 6 \\ \frac{x-3}{2} & < & -4 \end{array} \quad \begin{array}{rcl} \frac{x-3}{2} & < & -4 \\ x-3 & < & -8 \\ x & < & -5 \end{array}$$

$$\begin{array}{rcl} \frac{x-3}{2} & < & 4 \\ x-3 & < & 8 \\ x & < & 11 \end{array}$$

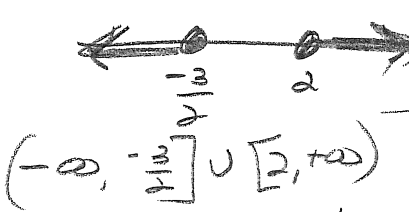
17.  $-2|x+4| < 22$

$|x+4| > 11$   
all real #s



18.  $-2|4t-1|-6 \leq -20$

$$\begin{array}{rcl} -2|4t-1|-6 & \leq & -20 \\ +6 & & +6 \end{array} \quad \begin{array}{rcl} -2|4t-1| & \leq & -14 \\ |4t-1| & \geq & 7 \end{array}$$

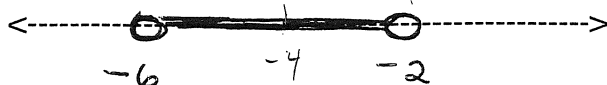


$$\begin{array}{rcl} 4t-1 & \leq & -7 \\ +1 & & +1 \end{array} \quad \begin{array}{rcl} 7 & \leq & 4t-1 \\ +1 & & +1 \end{array}$$

$$\begin{array}{rcl} 8 & \leq & 4t \\ 2 & \leq & t \\ t & \geq & 2 \end{array}$$

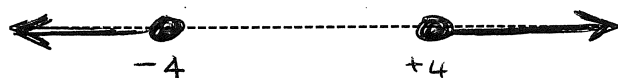
# Problem Solving

19. Write an absolute value inequality from the graph.



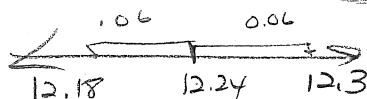
$$|x + 4| < 2$$

20. Write an absolute value inequality from the graph.



$$|x| \geq 4$$

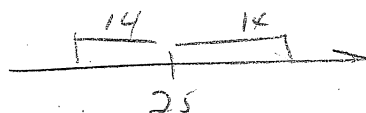
21. The ideal diameter of a gear for a certain type of click is 12.24mm. An actual diameter can vary by 0.06mm. Find the range of acceptable diameters.



$$|x - 12.24| \leq 0.06$$

Let  $x$  = actual diameter

22. A meteorologist reported that the previous day's temperatures varied by 14 degrees from the normal temperature of 25 degrees. What were the maximum and minimum temperatures possible on the previous day? Write an absolute value equation for the temperature.

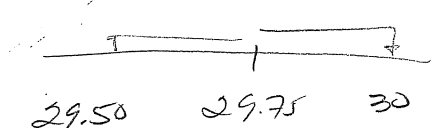


$$|x - 25| \leq 14$$

Let  $x$  = actual temp

minimum of  $11^{\circ}$   
maximum of  $39^{\circ}$

23. A junior high school basketball should have a circumference of 29.75 inches. The acceptable tolerance is 0.25 inches. Find the acceptable range of the circumference of the basketballs by setting up and solving an absolute value inequality.



$$|x - 29.75| \leq 0.25$$

Let  $x$  = actual

Circumference.

$$29.5 \leq x \leq 30 \text{ inches}$$

The range is from 29.5 in to 30 in.